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A DISTRIBUTIONAL SURVEY OF THE WORLD GENERA OF AQUATIC DRYOPOID BEETLES (COLEOPTERA: DRYOPIDAE, ELMIDAE, AND PSEPHENIDAE *SENS. LAT.*)

HARLEY P. BROWN

Dept. of Zoology, and
Stovall Museum of Science and History, Univ. of Oklahoma, Norman 73019

Since dryopoid beetles are so widely distributed, are commonly present throughout the year, and are often highly diagnostic of water quality, they are gaining increased attention. This is especially true in the United States because of legal requirements for environmental assessment. The Nearctic fauna is reasonably well known (Brown 1975, 1976), although a number of species await description. Not surprisingly, the European members of the group are even better known, but it is no simple matter to learn what lives where, even in Europe. The world picture is infinitely more discouraging: the literature is scattered and difficult to track down. The most recent attempt at a comprehensive catalog or checklist is well over half a century old (Junk and Schenkling 1910, 1914). Blackwelder's supplements to Leng (1920) and his checklist for the rest of this hemisphere (1944) with its extensive bibliography (1957) are of tremendous help, but a large portion of our present taxa have been described subsequent to his work. Hinton, who contributed most to our knowledge of Neotropical dryopoids, died before achieving his goal of monographing the South American elmids. I know of no one on the scene today who is familiar with that diverse fauna, much less the dryopoids of the world. Delève would have been the logical person to monograph the Ethiopian elmids and dryopids, but he, too, died before accomplishing such a task. My own collecting has been limited to western Europe, South America, Central America, and the West Indies, in addition to the United States, and I confess to but a superficial acquaintance with the riffle beetles of these regions. My knowledge of the dryopoids of Australia, Asia, Africa, etc. is derived almost exclusively from such literature as I have been able to assemble. This paper is a summary of what I have gleaned. It could save others a great deal of time and effort. If readers note omissions or errors, I should greatly appreciate their kindness in informing me of such.

Taxonomic history poses problems for those who wish to organize or list taxa, and the history of dryopoids is perhaps more confusing than most. Since details will soon appear in forthcoming sections of the *Catalog of the*

Coleoptera of America North of Mexico (Brown, in press), I shall present here only what is necessary for the reader to use the major literature. For much of its history, most of the group was treated under the family name Parnidae, which later became Dryopidae. The psephenids have held family status for over a century, though some authors have considered them but a subfamily of Dryopidae as recently as 1939. Nor is the composition of the family Psephenidae settled at present: each of the groups treated here as subfamilies is placed in a separate family by such workers as Bertrand (1972). To make matters even worse, the members of two of these subfamilies (Eubrianacinae and Eubriinae) are put by Arnett (1963) and Bertrand (1972) in another *superfamily,* the Dascilloidea. They are not original or unique in this. Bertrand also treated elmids as but a subfamily within the Dryopidae, and retained *Lutrochus* in this family, whereas virtually everyone else accords the elmids family status and most have followed Hinton (1939) in transferring *Lutrochus* to the Limnichidae. It now appears that *Lutrochus* merits a family of its own, but I shall not deal with that issue here. As for the elmids, many authors in recent years had been employing the family name Elminthidae for them until Steyskal (1975) clarified the proper derivation as Elmidae.

At the generic level, considerable confusion stems from the fact that, for a long time, many species of *Helichus* were placed in the genus *Dryops,* whereas many *Dryops* were called *Parnus*. However, some *Helichus* were also described as *Parnus,* and four genera (*Parygrus, Pachyparnus, Pomatinus* and *Potaminus*) were created for portions of the present genus *Helichus*. Somewhat comparable mix-ups occurred between the Palaearctic genera *Elmis* and *Limnius,* and members of many genera around the world were originally assigned to one or the other of these two. Until quite recently, those species now in the genus *Limnius* were called *Lat(h)elmis,* members of the genus *Oulimnius* being placed in *Limnius*.

To minimize confusion, I am omitting synonyms from the distribution tables. For the benefit of readers who wish to reconcile these tables with previous lists, however, I am listing major synonyms, etc. in Table 5.

Eventually, I expect to publish a world checklist of species, but that is beyond the scope of this survey. The present paper is intended to provide an overview of the distribution of those genera which have been described to date. Additional genera are in the offing. I am in the process of describing several new Neotropical genera of elmids and dryopids, and am either describing or planning to describe larvae representing 2 new genera of eubriine psephenids (or eubriids)—one from Central America and one from India. Thus, although the tables are presumably up to date, they are far from complete. The numbers of species will also change, of course. Most of my new species in process of or awaiting description are Neotropical and Nearc-

Table 1. Distribution of species of Dryopidae.

Genera	Nearctic	Neotropical	Palaearctic	Ethiopian	Oriental	Australian	Total
Ahaggaria Bollow 1938	0	0	0	3	0	0	3
Ceradryops Hinton 1937	0	0	0	0	1	0	1
Drylichus Heller 1916	0	0	0	0	0	1	1
Dryops Olivier 1791	2	20	30	19	1	0	72
Elmomorphus Sharp 1888	0	0	1	0	11	1	13
Elmoparnus Sharp 1882	0	6	0	0	0	0	6
Geoparnus Besuchet 1978	0	0	0	0	1	0	1
Helichus Erichson 1847	9	18	10	5	20	0	62
Malaiseianus Bollow 1940	0	0	0	0	1	0	1
Onopelmus Spangler 1980	0	1	0	0	0	0	1
Oreoparnus Delève 1965	0	0	0	2	0	0	2
Pelonomus Erichson 1847	1	10	0	0	0	0	11
Phallodryops Delève 1963	0	0	0	1	0	0	1
Protoparnus Sharp 1883	0	1	0	0	0	3	4
Rapnus Grouvelle 1899	0	0	0	3	0	0	3
Sostea Pascoe 1860	0	4	1	1	43	0	49
Sosteamorphus Hinton 1936	0	1	0	0	0	0	1
Strina Redtenbacher 1867	0	0	0	4	0	0	4
TOTAL GENERA	3	8	4	8	7	3	18
TOTAL SPECIES	12	61	42	38	78	5	234

tic, but we may expect many more from China, Australia, and numerous other regions. Certainly South America will still yield many.

The tables list for each genus the number of species known from the various zoogeographic realms. For the most part, this is quite satisfactory, but problems arise with species whose distribution straddles a boundary. Instead of complicating tabulation by listing such species in both realms, I have simply attempted to assign them to what I think to be the more appropriate realm. In brief, the regions included in the realms, with a summary of their dryopoids, are as follows:

NEARCTIC (North America from the Mexican highlands northward): dryopids—3 genera with 12 species; elmids—1 genus with 2 species of Larinae plus 24 genera with 84 species of Elminae; psephenids—1 species of Eubrianacinae, 1 genus with 7 species of Psepheninae, and 4 genera with 8 species of Eubriinae.

NEOTROPICAL (Mexican lowlands, Central America, West Indies and South America): dryopids—8 genera with 61 species; elmids—6 genera with 20 species of Larinae plus 30 genera with 295 species of Elminae; psephenids—1 species of Eubrianacinae, 4 genera with 17 species of Psepheninae, and 5 genera with 19 species of Eubriinae.

PALAEARCTIC (Eurasia south to the Himalayas, Afghanistan, Iran, etc., and Africa north of the Sahara Desert): dryopids—4 genera with 42 species; elmids—3 genera with 5 species of Larinae plus 24 genera with 137 species of Elminae; psephenids—2 genera with 11 species of Eubrianacinae, 2 genera with 5 species of Psepheninae, 1 species of Psephenoidinae, and 5 genera with 7 species of Eubriinae. Of the 24 species of psephenids, only one (*Eubria palustris*) occurs north or west of China, the remaining 23 occurring in China and Japan and having their affinities primarily with the Oriental fauna. Surprisingly, however, a fossil species of *Eubrianax* has been reported from France.

ETHIOPIAN (Africa including and below the Sahara Desert plus Madagascar): dryopids—8 genera with 38 species; elmids—6 genera with 53 species of Larinae plus 25 genera with 265 species of Elminae; psephenids—1 genus with 6 species of Eubrianacinae, 1 species of Psephenoidinae, and 1 genus with 4 species of Eubriinae.

ORIENTAL (Asia south of the Himalayas, southern China, Taiwan, the Philippines, Indochina, Sri Lanka, the Malay Archipelago and Indonesia): dryopids—7 genera with 78 species; elmids—3 genera with 13 species of Larinae plus 18 genera with 130 species of Elminae; psephenids—17 species of *Eubrianax,* 2 genera with 2 species of Psepheninae, 5 species of *Psephenoides,* and 5 genera with 11 species of Eubriinae.

AUSTRALIAN (Australia, Tasmania, New Zealand, New Guinea and related islands): dryopids—3 genera with 5 species, none of which are in Australia itself; elmids—7 genera with 14 species of Larinae plus 7 genera

Table 2. Distribution of species of Elmidae: Larinae.

Genera	Nearctic	Neotropical	Palaearctic	Ethiopian	Oriental	Australian	Total
Disersus Sharp 1882	0	3	0	0	0	0	3
Dryopomorphus Hinton 1936	0	0	2	0	1	0	3
Hexanchorus Sharp 1882	0	7	0	0	0	0	7
Hispaniolara Brown 1981	0	1	0	0	0	0	1
Hydora Broun 1882	0	0	0	0	0	7	7
Hydrethus Fairmaire 1889	0	0	0	4	0	0	4
Lara LeConte 1852	2	0	0	0	0	0	2
Omotonus Delève 1963	0	0	0	5	0	0	5
Ovolara Brown 1981	0	0	0	0	0	2	2
Phanocerus Sharp 1882	0	7	0	0	0	0	7
Parapotamophilus Brown 1981	0	0	0	0	0	1	1
Potamocares Grouvelle 1920	0	0	0	4	0	0	4
Potamodytes Grouvelle 1896	0	0	2	35	0	0	37
Potamogethes Delève 1963	0	0	0	4	0	0	4
Potamolatres Delève 1963	0	0	0	1	0	0	1
Potamophilinus Grouvelle 1896	0	0	0	0	10	1	11
Potamophilops Grouvelle 1896	0	1	0	0	0	0	1
Potamophilus Germar 1811	0	0	1	0	2	2	5
Pseudodisersus Brown 1981	0	1	0	0	0	0	1
Stetholus Carter & Zeck 1929	0	0	0	0	0	1	1
TOTAL GENERA	1	6	3	6	3	7	20
TOTAL SPECIES	2	20	5	53	13	14	107

Table 3. Distribution of species of Elmidae: Elminae.

Genera	Nearctic	Neotropical	Palaearctic	Ethiopian	Oriental	Australian	Total
Ampumixis Sanderson 1954	1	0	0	0	0	0	1
Ancyronyx Erichson 1847	1	0	0	0	0	0	1
Aspidelmis Delève 1954	0	0	0	5	0	0	5
Atractelmis Chandler 1954	1	0	0	0	0	0	1
Austrolimnius Carter & Zeck 1929	0	18	0	0	0	52	70
Cephalolimnius Delève 1973	0	0	0	0	1	0	1
Cleptelmis Sanderson 1954	2	0	1	0	0	0	3
Coxelmis Carter & Zeck 1929	0	0	0	0	0	3	3
Ctenelmis Delève 1964	0	0	0	8	0	0	8
Cylloepus Erichson 1847	1	50	0	0	0	0	51
Dubiraphia Sanderson 1954	9	0	0	0	0	0	9
Dupophilus Mulsant & Rey 1872	0	0	1	0	0	0	1
Elmidolia Fairmaire 1897	0	0	0	6	0	0	6
Elmis Latreille 1798	0	0	13	0	0	0	13
"*Elmis*" (Not true *Elmis* but not yet assigned to proper genera)	0	11	0	0	0	0	11
Elpidelmis Delève 1964	0	0	0	2	0	0	2
Elsianus Sharp 1882	3	32	0	0	0	0	35
Epodelmis Hinton 1973	0	1	0	0	0	0	1
Esolus Mulsant & Rey 1872	0	0	11	0	1	0	12
Eumicrodinodes Delève 1965	0	0	0	3	0	0	3
Exolimnius Delève 1954	0	0	0	2	0	0	2

Table 3. Continued.

Genera	Nearctic	Neotropical	Palaearctic	Ethiopian	Oriental	Australian	Total
Gonielmis Sanderson 1954	1	0	0	0	0	0	1
Graphelmis Delève 1968	0	0	1	0	11	1	13
Grouvellinus Champion 1923	0	0	6	0	16	0	22
Gyrelmis Hinton 1940	0	12	0	0	0	0	12
Haplelmis Delève 1964	0	0	0	1	0	0	1
Hedyselmis Hinton 1976	0	0	0	0	1	0	1
Helminthocaris Grouvelle 1906	0	0	0	8	0	0	8
Helminthopsis Grouvelle 1906	0	0	0	35	0	0	35
Heterelmis Sharp 1882	3	13	0	0	0	0	16
Heterlimnius Hinton 1935	2	0	0	0	0	0	2
Hexacylloepus Hinton 1940	1	21	0	0	0	0	22
Hintonelmis Spangler 1966	0	10	0	0	0	0	10
Holcelmis Hinton 1973	0	2	0	0	0	0	2
Huleechius Brown 1981	1	1	0	0	0	0	2
Ilamelmis Delève 1973	0	0	0	0	3	0	3
Kingolus Carter & Zeck 1929	0	0	0	0	0	11	11
Lathridelmis Delève 1965	0	0	0	1	0	0	1
Leielmis Delève 1964	0	0	0	1	0	0	1
Leptelmis Sharp 1888	0	0	2	8	10	0	20
Limnius Illiger 1802	0	0	13	0	0	0	13
Lobelmis Fairmaire 1898	0	0	0	7	0	0	7

Table 3. Continued.

Genera	Nearctic	Neotropical	Palaearctic	Ethiopian	Oriental	Australian	Total
Ludyella Reitter 1899	0	0	1	0	0	0	1
Macrelmis Motschulsky 1859	0	14	0	0	0	0	14
Macronychoides Champion 1923	0	0	0	0	1	0	1
Macronychus Mueller 1806	1	0	1	0	2	0	4
Microcylloepus Hinton 1935	4	21	0	0	0	0	25
Microdinodes Grouvelle 1906	0	0	0	42	0	0	42
Narpus Casey 1893	3	0	0	0	0	0	3
Neocylloepus Brown 1970	1	6	0	0	0	0	7
Neoelmis Musgrave 1935	1	45	0	0	0	0	46
Neolimnius Hinton 1939	0	1	0	0	0	0	1
Neoriohelmis Nomura 1958	0	0	2	0	0	0	2
Nomuraelmis Satô 1964	0	0	1	0	0	0	1
Normandia Pic 1900	0	0	4	0	0	0	4
Notelmis Hinton 1941	0	2	0	0	0	0	2
Notriolus Carter & Zeck 1929	0	0	0	0	0	16	16
Onychelmis Hinton 1941	0	2	0	0	0	0	2
Oolimnius Hinton 1939	0	1	0	0	0	0	1
Optioservus Sanderson 1954	13	0	9	0	0	0	22
Ordobrevia Sanderson 1953	1	0	4	0	8	0	13
Oulimnius Des Gozis 1886	2	0	7	0	0	0	9
Pachyelmis Fairmaire 1898	0	0	0	33	0	0	33

Table 3. Continued.

Genera	Nearctic	Neotropical	Palaearctic	Ethiopian	Oriental	Australian	Total
Paramacronychus Nomura 1958	0	0	1	0	1	0	2
Peloriolus Delève 1964	0	0	7	0	0	7	7
Phanoceroides Hinton 1939	0	1	0	0	0	0	1
Pilielmis Hinton 1971	0	6	0	0	0	0	6
Podelmis Hinton 1941	0	0	0	0	7	0	7
Portelmis Sanderson 1953	0	2	0	0	0	0	2
Promoresia Sanderson 1954	2	0	0	0	0	0	2
Protelmis Grouvelle 1911	0	0	0	3	0	0	3
Pseudamophilus Bollow 1940	0	0	1	0	0	0	1
Pseudancyronyx Bertrand & Steffan 1963	0	0	0	12	0	0	12
Pseudelmidolia Delève 1963	0	0	0	28	0	0	28
Pseudomacronychus Grouvelle 1906	0	0	0	11	0	0	11
Rhizelmis Chandler 1954	1	0	0	0	0	0	1
Riolus Mulsant & Rey 1872	0	0	7	0	0	0	7
Simsonia Carter & Zeck 1929	0	0	0	0	0	16	16
Sphragidelmis Delève 1964	0	0	0	3	0	0	3
Stegoelmis Hinton 1939	0	3	0	0	0	0	3
Stenelmis Dufour 1835	27	0	36	36	45	2	146
Stenelmoides Grouvelle 1908	0	5	0	0	0	0	5
Stethelmis Hinton 1945	0	2	0	0	0	0	2
Taprobanelmis Delève 1973	0	0	0	0	1	0	1

Table 3. Continued.

Genera	Nearctic	Neotropical	Palaearctic	Ethiopian	Oriental	Australian	Total
Tolmerelmis Hinton 1972	0	1	0	0	0	0	1
Tolriolus Hinton 1940	0	1	0	0	0	0	1
Trachelminthopsis Delève 1965	0	0	0	1	0	0	1
Troglelmis Jeannel 1950	0	0	0	1	0	0	1
Tropidelmis Delève 1964	0	0	0	1	0	0	1
Tyletelmis Hinton 1972	0	1	0	0	0	0	1
Uralohelmis Roubal 1940	0	0	1	0	0	0	1
Urumaelmis Satô 1965	0	0	1	0	1	0	2
Vietelmis Delève 1968	0	0	0	0	1	0	1
Xenelmis Hinton 1936	0	9	0	0	0	0	9
Xenelmoides Hinton 1936	0	1	0	0	0	0	1
Zaitzevia Champion 1923	2	0	10	0	8	0	20
Zaitzeviaria Nomura 1961	0	0	3	0	13	0	16
TOTAL GENERA	24	30	24	25	18	7	96
TOTAL SPECIES	84	295	137	265	130	101	1,012
TOTAL ELMID GENERA	25	36	27	31	21	14	116
TOTAL ELMID SPECIES	86	315	142	318	143	115	1,123

with 101 species of Elminae; psephenids—2 genera with 7 species of Eubriinae.

Distribution maps, though not feasible for this paper, would bring out features not evident from the tables. For example, maps would show that the dryopoid fauna of the West Indies is obviously derived from South and Central America. There is virtually no overlap between Cuba and Florida, or any indication of transport to Cuba by drift from the mouth of the Mississippi River. Hinton (1965) makes this point quite effectively.

Table 4. Distribution of species of Psephenidae.

Genera	Nearctic	Neotropical	Palaearctic	Ethiopian	Oriental	Australian	Total
			Eubrianacinae				
Eubrianax Kiesenwetter 1874	1	1	10	6	17	0	35
Microeubrianax Pic 1954	0	0	1	0	0	0	1
			Psepheninae				
Mataeopsephus Waterhouse 1876	0	0	4	0	1	0	5
Pheneps Darlington 1936	0	5	0	0	0	0	5
Psephenops Grouvelle 1898	0	5	0	0	0	0	5
Psephenus Haldeman 1853	7	6	0	0	1	0	14
Sinopsephenus Nakane 1964	0	0	1	0	0	0	1
Xexanchorinus Grouvelle 1898	0	1	0	0	0	0	1
			Psephenoidinae				
Afropsephenoides Basilewsky 1959	0	0	0	1	0	0	1
Psephenoides Gahan 1914	0	0	1	0	5	0	6
			Eubriinae				
Acneus Horn 1880	4	0	0	0	0	0	4
Afroeubria Villiers 1961	0	0	0	4	0	0	4
Alabameubria Brown 1980	1	0	0	0	0	0	1
Cneoglossa Guérin 1843	0	8	0	0	0	0	8
Cophaesthetus Waterhouse 1880	0	0	0	0	1	0	1
Dicranopselaphus Guérin 1861	1	5	0	0	0	0	6
Drupeubria Nakane 1952	0	0	1	0	0	0	1

Table 4. Continued.

Genera	Nearctic	Neotropical	Palaearctic	Ethiopian	Oriental	Australian	Total
Ectopria LeConte 1853	2	4	0	0	2?	1?	9
Eubria Germar 1818	0	0	1	0	2	0	3
Grammeubria Kiesenwetter 1874	0	0	3	0	4	0	7
Homoeogenus Waterhouse 1880	0	0	1	0	0	0	1
Schinostethus Waterhouse 1880	0	0	1	0	2	0	3
Sclerocyphon Blackburn 1892	0	0	0	0	0	7	7
Tychepsephus Waterhouse 1876	0	1	0	0	0	0	1
TOTAL GENERA	6	9	10	3	9	2	24
TOTAL SPECIES	16	36	24	11	35	8	130

In scanning the tables, I am impressed with the fact that most of the genera are endemic, or confined to one realm. This fact, too, would be much more conspicuous if distribution maps were included for each species. Of the 159 genera, not one can be considered truly cosmopolitan. Most nearly cosmopolitan is the dryopid *Helichus,* with the elmid *Stenelmis* a close runner-up. The only psephenid in the running would be *Eubrianax.* One conclusion I draw from the extensive endemism and the failure of any species, or even any genus, to become cosmopolitan, is that dryopoid beetles are unlikely to become of major economic importance as pests.

The only instance of successful intercontinental hitchhiking by a dryopoid that I know about is *Dryops viennensis,* a European species which has become established along the St. Lawrence River of eastern Canada. Undoubtedly there are other transplants not yet detected or reported, but if they were pests they would probably have been noticed.

I have mentioned above the difficulty posed by species whose geographic ranges straddle boundaries between adjacent realms, and suggested that distribution maps for each species would serve to clarify the situation. Perhaps a bit of discussion is in order. Among the Larinae I do not list *Phanocerus* as Nearctic, although one of the widely-distributed Neotropical species extends into Texas. Among the Elminae, *Xenelmis* occurs in Arizona, and the number of Nearctic species would be increased for such genera as *Cylloepus, Heterelmis, Hexacylloepus* and *Neoelmis* if I included

Table 5. Sources of confusion: synonyms, homonyms, and genera of other families which have been listed as dryopoids.

Afropsephenium Paulian 1946—not a psephenid, or even a dryopoid
Alloparnus Broun 1893 = *Protoparnus*
Aptyktophallus Steffen 1957 = *Normandia*
Awadoronus Kono 1934 = *Zaitzevia*
Betelmis Matsumura 1916 = *Mataeopsephus* (Psephenidae)
Chelonarium Fabricius 1801—Chelonariidae, a dryopoid family
Drupeus Lewis 1895—Ptilodactylidae, another dryopoid family
Dryopidius Grouvelle 1896 = *Elmomorphus*
Dryopomorphus Hinton 1936—shifted to Elmidae: Larinae
Dryops Leach 1817 = *Helichus*
Eurea LeConte 1853 = *Ectopria*
Eurypalpus LeConte 1852 = *Psephenus*
Fluvicola DeKay 1844 = *Psephenus*
Freyiella Bollow 1938 = *Potamophilinus*
Furcipalpus Guerin 1861 = *Dicranopselaphus*
Gridelliana Bollow 1939 = *Potamodytes*
Grouvelleus Zaitzev 1908 = *Grouvellinus*
Helminthopsoides Delève 1954 = *Elmidolia*
Helmis Bedel 1878 = *Elmis*
Lareynia DuVal 1859 = *Elmis*
Lat(h)elmis Reitter 1883 = *Limnius*
Limnius Erichson 1847 = *Oulimnius*
Lutrochus Erichson 1847—Limnichidae or Lutrochidae, other dryopoid families
Macroeubria Pic 1916—Ptilodactylidae, another dryopoid family
Mataeopsephenus Zaitzev 1908 = *Mataeopsephus*
Microdes Motschulsky 1859 = *Grouvellinus*
Neosolus Carter & Zeck 1929 = *Austrolimnius*
Oberonus Casey 1893 = *Pelonomus*
Pachycephala Broun 1881 = *Hydora*
Pachyparnus Fairmaire 1888 = *Helichus*
Parnida Broun 1880 = *Protoparnus*
Parnoides Kuwert 1900 = *Pelonomus*
Parnus Fabricius 1792 = *Dryops*
Parygrus Erichson 1847 = *Helichus*
Philhydrus Duftschmidt 1805 = *Elmis*
Placonycha Horn 1880 = *Eubrianax*
Pomatinus Sturm 1853 = *Helichus*
Potaminus Lacordaire 1854 = *Helichus*
Pseudochelonarium Mequignon 1935—Chelonariidae, another dryopoid family
Spineubria Nakane 1952—Ptilodactylidae, another dryopoid family
Stenelsianus Hinton 1934 = *Stenelmoides*
Tychepsephenus Zaitzev 1908 = *Tychepsephus*
Udorius Broun 1882 = *Hydora*
Ulimnius Grouvelle 1896 = *Oulimnius*

Mexican species that extend across the border. These genera, together with *Elsianus* and *Neocylloepus,* are really Neotropical, and it seems a bit inappropriate to list them as Nearctic at all. This is also the case for a number of genera that are really Oriental, but which extend up into eastern China and Japan and thus qualify as Palaearctic. I have already pointed out the psephenids in this category; examples of elmids are *Dryopomorphus, Gra-Phelmis, Grouvellinus, Leptelmis, Ordobrevia, Zaitzevia,* and *Zaitzeviaria,* none of which range westward into Europe. Of these, *Ordobrevia* and *Zaitzevia* extend, instead, across into western North America, as do *Cleptelmis* and *Optioservus*. In the case of *Optioservus,* and perhaps *Cleptelmis* as well, movement across the Bering Strait land bridge was probably from Nearctic to Palaearctic rather than the reverse, since *Optioservus* is widely distributed across North America and represented by 13 species, whereas in the Old World it seems confined to Japan. For *Ordobrevia* and *Zaitzevia,* on the other hand, the migration was almost certainly from the Old World to the New. Some relationships of this sort can, of course, be surmised from the tables. The 2 "Palaearctic" species of *Potamodytes,* as one might suspect, are escapees from the Ethiopian realm, one into Egypt, the other into the Arabian Peninsula.

The absence of dryopids from the continent of Australia is noteworthy. It suggests that the family did not arise until after the geological isolation of that land mass. Equally interesting to me is the only major generic linkage between Australia and any other realm—the elmid genus *Austrolimnius*. It is well represented in both Australia and South America. Furthermore, one of the species from southern Australia is more closely related to a couple of species in Chile than to any of its fellow Australian species (Hinton, 1965, 1968). When one takes into account the fact that these beetles are very intolerant of environmental diversity, that they disperse very slowly and are unlikely to be transported by accident, this situation presents very cogent evidence of the ancient connection between these two continents. While discussing *Austrolimnius,* I might add that Hinton (1971) stated that it was the dominant elmid genus of New Guinea as well as Australia, but none of the species from New Guinea has yet been described.

In my association with them for over 20 years, I have noted the greater diversity of riffle beetles in tropical streams as compared with streams in temperate zones, and the reduction in variety as one ascends higher among the mountains. Near the snow line, at least in our Rockies and the Mexican sierras, there is but a single species left. When assembling data for the tables presented here, at first I took for granted that the greater numbers of Neotropical genera and species than Nearctic ones, for example, reflected this same principle. Perhaps they do, but the evidence is not as overwhelming as I initially thought. In the case of the Neotropical taxa, one cannot tell from the tables what proportion represent temperate rather than tropical

climates. Essentially everything from Chile would be from temperate zones, and a disproportionate portion of Brazilian specimens described thus far have come from the southernmost regions, which are not genuinely tropical. Again, maps would help resolve the issue. Unfortunately, however, all too many species are known only from the original description, with no more precise locality data than "Brazil" or "Argentina."

One thing shown clearly by the tables is the large number of genera represented by only one species. In this category are 7 of the 18 dryopid genera, 6 of 20 Larinae, 29 of 96 Elminae, and 9 of the 25 psephenids, for a total of 51 out of 159 genera—approximately one-third.

This impresses me as a very high proportion. So far as I can judge, it does not simply reflect a tendency on the part of dryopoid taxonomists to be splitters, although it is possible that this plays a minor role. It is also probable that additional species will be described for some of these genera, but I think the proportion of genera represented by unique species will remain quite high. Undoubtedly, at least some of these are relicts—the last survivors of groups formerly more widespread and diverse. Although a few of them are widely distributed, e.g. *Ancyronyx* and *Dupophilus,* most of them are apparently confined to rather small areas and restricted habitats. Some may be extinct by the end of this century. They will not receive the attention given the dodo or the passenger pigeon, but we riffle beetle buffs will mourn their loss as well as the loss of the delightful habitat that sustained them.

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